Notes on the Eggs, Tadpoles, Metamorphosis, and Ecology of the Ceylonese Narrow-mouthed Frog *Ramanella obscura* (Günther)

BY

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(*With two plates and four text-figures*)

INTRODUCTION

Knowledge of the eggs, tadpoles, life-history, and general ecology of the majority of the Amphibia peculiar to Ceylon is very incomplete, and of the fourteen such species the tadpoles of eight and the eggs and life-histories of all fourteen still await complete investigation. The genus *Ramanella* Rao is represented in Ceylon by three species two of which, *R. palmata* and *R. obscura*, are peculiar to the island; the third, *R. variegata*, occurs also in south India (Parker, 1934; Kirtisinghe, 1957).

This paper describes for the first time the eggs, tadpoles, and metamorphosis of the Narrow-mouthed Frog *Ramanella obscura* (Günther). Also added are a few notes on its ecology.

MATERIALS AND METHODS

Examination of the eggs from freshly-deposited spawn was undertaken with a microscope fitted with an ocular micrometer. The account of the larval stages is taken from a batch of ova deposited in the field. The tadpoles of a second batch of ova deposited in the laboratory were bred at a temperature of 70°-80° F. (24°-27° C.) and fed on mashed spinach. At intervals of five days total length measurements were taken from both batches with a dial caliper and the results recorded (Table 1).

BREEDING ACTIVITY

On 12 October 1957 the north-east monsoon broke over Kandy District and by the 15th a considerable amount of calling was heard from some roadside silt pits at Hantane, about two miles south of

Kandy town (2,600 ft.). On investigation, each flooded silt pit was found to contain up to fifteen loudly-calling *Ramanella obscura*. The call is very similar to that of its related species *R. variegata* which has been described as 'qhauy, qhauy, qhauy' (Rao, 1918), though possibly not so loud. With the exception of two females, all were males that had just arrived at their breeding sites and were floating on the water with their limbs partly extended in an attitude similar to that adopted by *Rana c. cyanophlyctis*, or else clutching floating debris with just their heads and forelegs showing above the water. During the following week females became more numerous and spawn was to be found in most pits. By the 26th, ten days after breeding commenced, there was not a frog to be found but eggs and young tadpoles were left in abundance.

The position during amplexus was semi-pectoral with the arms of the male passing just behind and beneath those of the female, the palms and fingers turned out and digging into the pectoral area. During amplexus the pair never left the water for more than a minute or two, and during these short periods the hindlegs of the male were brought up so that the thighs, shanks, and feet were well together above the waist or thighs of the female (Plate I, fig. 1). When in the

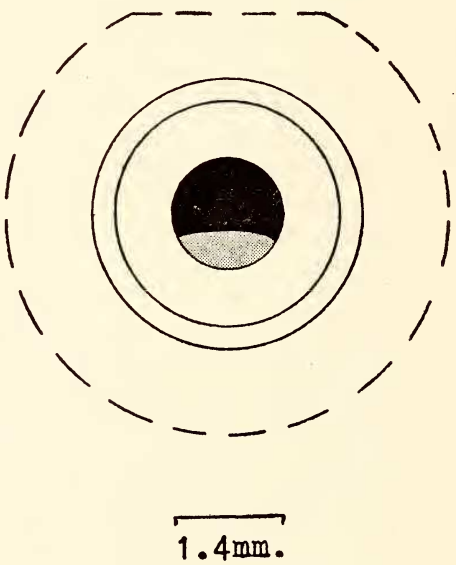

Fig. 1. Diagram of egg. (Broken line indicates loose envelope)

water the pair remained afloat, with or without the female clutching some form of support, and with their feet flexed and pointing dorso-laterally at an angle of approximately 45° to the long axis of the

1. Position during amplexus on land

2. Position during amplexus in water

Photos : A. M. Morgan-Davies

1. Larval stages

2. Adult male and female *Ramanella obscura*

Photos : A. M. Morgan-Davies

body (Plate I, fig. 2). From the lateral view the pair float with their nostrils and eyes just clear of the water and their bodies at an angle of approximately 30° to the surface. Unfortunately the act of ova deposition was not observed, though it was noted that in three cases in captivity ova deposition took place between 10 a.m. and 3 p.m.

Embryonic Development

The egg mass is deposited as a surface film, either in a single mass or more often in small batches, independent of any form of anchorage or support. Should the water be disturbed the eggs are easily separated into smaller batches or single eggs, and throughout the ova stage do not sink below the surface unless compelled. They are truncated spheres, flat above with a loose outer envelope. A count of the ova deposited by three females in captivity revealed 514, 530, and 626 ova, or a mean of 557. Examination with a microscope disclosed the presence of three gelatinous envelopes, the inner envelope being .80 mm., the middle .27 mm., and the outer 1.08 mm., (Fig. 1). The vitellus is dark brown and light tan, about 1.35 mm., in diameter. Embryonic development from fertilisation to hatching takes approximately seventy-two hours at a temperature maintained at 77° F. +3° (25° C.).

Larval Development

On hatching the tadpoles are a uniform pale brown in colour with the exception of the ventral surface and fin membranes which are translucent. Within forty hours of hatching the external gills, which are small and only clearly visible from the ventral view with the aid of a lens, are absorbed and the spiracle can be seen as an opening just forward of the anus in the mid-ventral line.

By the twenty-fifth day of development the tadpoles are approximately 21 mm. in length, pigmentation has become more intense and changed from a pale brown to a dark grey-black throughout the dorsal surface of the body and tail musculature and lightly spread across the tail crests except for a narrow translucent border which is comparatively free from melanophores. The heart and intestines can be seen through the abdominal wall.

Within the following ten days the hindlimbs and toes are well developed in the majority of tadpoles, the measurements being as follows: Body length 10 mm., tail length 20.5 mm., total length 30.5 mm., tail width 5 mm. The head and body is oval, one and a half times as long as broad. The mouth is dorso-terminal without

horny mandibles and the lips without horny teeth or papillae (Fig. 2). The nostrils are slightly nearer to the tip of the snout than to the eyes and the internarial width is equal to about one quarter the inter-

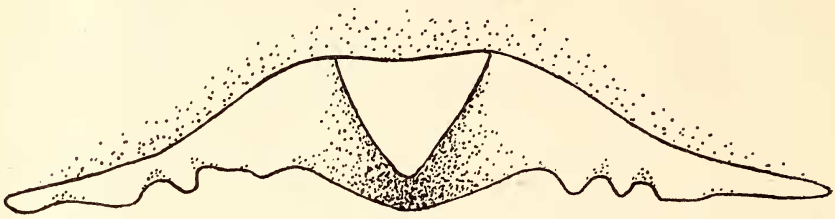

Fig. 2. Mouth parts of tadpole

orbital. The spiracle is a translucent tube extending backwards beyond the anus on the mid-ventral line (Fig. 3). The tail is lanceolate, with the crests of equal depth, the dorsal crest starting slightly aft of the ventral.

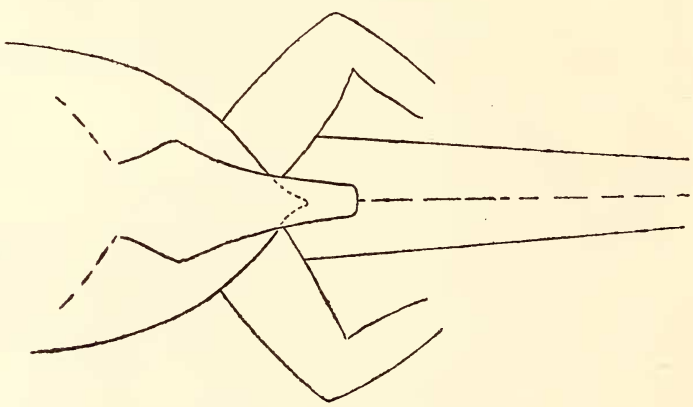

Fig. 3. Diagram of spiracle

Within the next ten days the forelimbs emerge and the coloration and markings on the body and limbs approximate very closely to those of the adult frog. The measurements of the tadpoles at this stage are: body length 9.5 mm., tail length 16 mm., total length 25.5 mm., tail width 2.5 mm., femur length 4 mm., and tibia length 3.75 mm.

In the majority of tadpoles metamorphosis is reached within the 50th to 60th day of development and the measurements of the young frogs at this stage are: length of head and body 9.5 mm., length of femur 4.25 mm., and length of tibia 4 mm.